



## Case Study #2: Pollution Prevention at Medical Facilities in New Mexico, 2001

This case study number two presents general observations and pollution prevention opportunities for hospitals. The purpose of this document is to establish a framework for pollution prevention and waste management at all hospitals. Four different assessments were conducted at hospitals in New Mexico during 2001.

This document has been prepared as part of the City of Albuquerque's Pollution Prevention grant funded by **EPA** for Hospital Pollution Prevention, and is based on a report prepared by **CGH Environmental Strategies, Inc.** of Burlington, Vermont, who served as project consultants.

### Step One: Assess Current Situation and Goals

One of the first questions medical facilities must ask is "Who owns the waste system?" A **process owner should be identified** to oversee waste management and source control. Comprehensive waste management involves the oversight and coordination of multiple waste streams from many departments, staff education, collection schedules, vendor relationships, contracts, and regulatory compliance. Indicators or symptoms that ambiguity exists such as overfull sharps containers, variation in container types and placement, absence of data, and uncharacterized hazardous wastes.

Most hospital departments generate wastes that are in more than one waste category. A process owner can ensure that wastes in all departments are being managed appropriately and that the myriad of regulatory requirements is met. The goal of a waste management program is to **manage wastes in the most environmentally and economically responsible** fashion, while ensuring regulatory compliance and worker safety are addressed.

Hospitals should accurately determine **waste generator status** by characterizing and counting wastes generated on site. All facilities should address hazardous wastes storage, spill readiness, and furnish materials and training for employees.

### Step Two: Identify Pollution Prevention Opportunities

#### Solid Waste

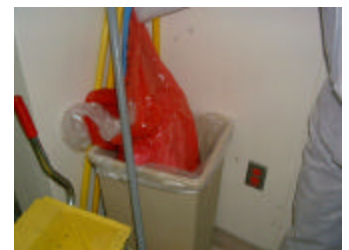
Organizations should examine solid waste quantities, and opportunities to reduce solid waste through recycling, reuse, and reduction.



Waste from total knee case. Note clean solid waste discarded in red bags.

- Collect solid waste (trash) in clear bags (instead of black bags). This allows for continuous quality improvement by inspection of wastes as they are discarded.
- Workers should wear additional Personal Protective Equipment (PPE) beyond latex gloves when handling bags of trash.

- Request tare slips for every load of solid waste collected to verify waste generation (and full containers).
- Is staff adequately trained on what is solid waste, and what is biomedical waste?



OR: Error in segregation. Staff placing red bag in clear bags.



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### Biohazard Waste

- Review waste acceptance protocols from biomedical collection company.
- Review definition of 'trace' chemo acceptable for disposal in biohazard waste containers. Pharmacy and Oncology departments should ensure only TRACE chemo is being sent off as biomedical waste.
- Chemo spill kits should be available in the biohazard waste storage area. Facilities should have a spill prevention plan and protocol for the biohazard waste storage area.

Waste from total knee case. Note clean solid waste discarded in red bags.



OR: Kick bucket with clean waste inside.



Improper use of a red bag for solid waste

- NM medical waste regulations require absorbent material (pads preferably) in bottom of each waste container. Provide sorbent pads in packing room or utility areas where waste is aggregated to facilitate compliance with this requirement.



- Medical facilities should control who has access to Biomed waste storage area.

- Pathological waste should be segregated. Waste should be **labeled "for incineration only"** from point of generation. It may **mean placing a second container** labeled **"for incineration only"** in certain areas.

- Employees should have vendor contact information and waste acceptance protocol available.
- Check with vendor to find out if they offer extra services and products such as sorbent pads/material, a staging area for empty containers, etc. Hospitals may want to consider sharing information regarding vendors and compare rates.
- Does your medical facility have a disposal regimen that includes collection at source points for chemo wastes (pharmacy, oncology, and pediatrics) that exceed trace quantities?



OR: anesthesia waste can – clean solid waste in red bag.

### Hazardous waste

- Inventory & review storage compatibility of materials. Are their unlabeled items on shelves? Define the purpose of the space. Are hazardous materials and hazardous wastes stored separately? Who has access to hazardous materials and storage facilities?
- Facilities should review RCRA requirements for buildings, containers, spill preparedness, communication devices. See website <http://www.epa.gov/epaoswer/hotline/index.htm> for information on RCRA requirements.





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- Reference JCAHO standards that address hazardous materials, hazardous wastes, and list the need for compliance with state, local and federal regulations regarding hazardous waste.
- Are there less hazardous substitutes available for hazardous material used? For example, solvent substitutes, non-mercury containing instruments, etc. Visit the **Hospitals for a Healthy Environment** - Environmentally Preferable Purchasing Site for information: [http://geocities.com/EPP\\_how\\_to\\_guide/](http://geocities.com/EPP_how_to_guide/)

### Universal Waste

Materials such as batteries, thermostats, spent fluorescent lamps, and agricultural pesticides can be collected for disposal under the **Universal Waste Rule, which** allows greater flexibility to dispose of some wastes.

- Consider a formalized used battery collection program for all types of batteries. Containers for collection should be labeled **used batteries for recycling**. Identify vendors that will recycle batteries and provide documentation. Disposing of batteries under the Universal Waste Rule will help reduce hazardous waste volumes.
- Collect spent fluorescent lamps for recycling or for disposal as a hazardous waste. Recycling carries the least amount of liability and will reduce hazardous waste generation.



Fluorescent light tubes collected for recycling diverts mercury-containing products from landfills & incinerators.

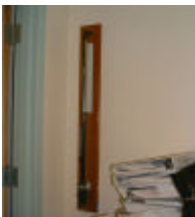
### Recyclable waste

- Recycle cardboard to reduce solid waste pickups. If employees are required to operate a baler. Check to be sure proper *lock out/tag out* program is in place for the baler, and that staff has formal documented training in baler use. Corrugated cardboard can have market value. Explore options with local vendors.
- Medical facilities should make sure collection containers are uniform in appearance, and that they can't be confused with other collection containers, i.e., waste paper collection bins are yellow and hazardous waste containers are yellow.
- Explore diverting other materials for recycling i.e., steel cans in kitchens, scrap metal, construction and demo wastes. Steel cans from kitchen, aerosol cans, etc, may be allowable as part of scrap metal collection. Check with your vendor

### Mercury Pollution Prevention

Inventory and phase-out use of mercury containing healthcare products and devices

- Sphygmomanometers
- Thermometers
- Esophageal dilators from endoscopy



Mercury containing barometer

- Are there vials of mercury in Biomed area?
- Check thermostats and switches to ensure that mercury-containing equipment is retired.
- Check the list of chemicals used by laboratory (outsourced vendor) for mercury containing chemicals substitute with other chemicals.



Mercury containing manometer for calibration.



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- Check cleaning supplies to ensure that they don't contain mercury.
- Mercury collects in drain traps and could lead to a mercury discharge. Implement a facility-wide drain trap clean out.

### Laboratory Pollution Prevention

Lab services that are 'contracted out' does not lessen the requirements or responsibilities of hospitals to comply with RCRA regulations.

- Check with contracted labs to make sure they are complying with RCRA regulations.



Cart with containers of formalin. Store containers of formalin with secondary containment (use tray or tubs) to prevent spills & leaks.

- The picture to the right is **not** a best management practice. Check with your local wastewater treatment plant about their policy on waste formaldehyde solutions.
- Keep in mind a ten percent formalin solution contains **37,000 parts per million of formaldehyde**. Determine the



Collection of used formalin in large container. Formalin is "neutralized" with sodium bisulfate & discharged to sanitary sewer system.

composition of the commercial formaldehyde solution your facility is using by checking MSDS Sheet.

- Characteristics of formaldehyde that may make it hazardous are ignitability (flash point **less than 140 degrees Fahrenheit**) corrosiveness, (**pH lower than  $\leq 2$** ), cross contamination with mercury solutions.
- Have spill clean up materials for formalin spill readily available.
- Check the City of Albuquerque's **Best Management Code of Practice for Biomedical Laboratories** for best management practices concerning waste formaldehyde solutions. The **Best Management Code of Practice for Biomedical Laboratories** can be downloaded from the p2 Program's web page at <http://www.cabq.gov/p2>, or contact the p2 Program at 873-7058/7059 for a free copy!
- Minimize use of hazardous chemicals such as Bouins solution. Picric acid is used in fixatives such as Bouin's fixative. Picric acid is explosive when dry, shocked, heated, or comes in contact with metals or metallic salts. It is toxic by skin absorption and its use should be avoided as much as possible. See the **Best Management Code of Practice for Biomedical Laboratories** for more information concerning substitutes, etc.

### Hazardous Pharmaceuticals

Many cytotoxic agents fall under the RCRA characteristic wastes (generators are obligated to 'characterize' their waste before disposing of it -- nearly all chemo meds are toxic, some are corrosive/irritant) and should be disposed of accordingly. Review vendor's waste acceptance protocol for chemotherapy wastes.

- Research the potential for using reverse distribution firm to divert expired and unused pharmaceuticals from landfills, wastewater & incinerators.
- Uncontaminated Personal Protective Equipment (PPE) can be disposed of as solid waste







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- Make sure Reverse Distribution company has the capability to destroy hazardous pharmaceuticals i.e., epinephrine, warfarin, nitroglycerine
- Listed below are three web sites from a cancer center in Texas describing research findings on contamination levels of pharmacies by chemo residuals -- on surfaces, which result in unintentional exposures to pharmacists and pharmacy workers. Another reasons to err on the side of caution when disposing of and managing cytotoxics.

[http://www.tmc.edu/tmcnews/09\\_01\\_99/page\\_11.html](http://www.tmc.edu/tmcnews/09_01_99/page_11.html) and  
[http://www.uth.tmc.edu/uth\\_orgs/pub\\_affairs/mm/september99/cytotoxic.html](http://www.uth.tmc.edu/uth_orgs/pub_affairs/mm/september99/cytotoxic.html)  
[http://www.uth.tmc.edu/schools/sph/an\\_agents/guide.htm](http://www.uth.tmc.edu/schools/sph/an_agents/guide.htm)



Expired & unused  
pharmaceuticals  
returned to a reverse  
distribution company

- According to the RCRA, Superfund, & EPCRA Hotline Training Module (40 CFR Parts 264/265 Subpart 1 261.7 "A container or an inner liner removed from a container holding nonacute hazardous was as identified in Part 251 Subpart D is empty when: no more than 3% by weight of the container with a capacity of 110 gallons or less, and no more than 0.3 percent by weight remains for containers with a capacity greater than 100 gallons"  
<http://www.epa.gov/epaoswer/hotline/modules.htm>
- Gluteraldehyde in concentrations **2% to 4%** will lose toxicity **when held for 14 to 21 days** and can be discharged to the City of Albuquerque's sewer system as long as other contaminants aren't present. Check with the local wastewater treatment plant about disposing of higher concentrations of used gluteraldehyde solutions.

### **Radiology**

Spent fixer solutions contain high concentrations of silver a listed hazardous waste. The City of Albuquerque has a stringent limit for silver. Many hospitals are considering a digital imaging systems to reduce of fixer waste.

- Hospitals can save money by reclaiming spent fixer solutions from X-Ray for recycling. Recycling spent fixer eliminate the need for disposing of it as hazardous waste, and could possibly reduce hospitals' generator status. See the City of Albuquerque's ***Best Management Code of Practice for Photoprocessors*** for more information [www.cabq.gov/p2](http://www.cabq.gov/p2) or call the p2 Program at 873-7058/7059 for more information.
- Hospitals can recycle lead aprons through a recycler. Some hospital staff recycle large lead aprons into smaller lead garments.

Products delivered  
in reusable totes  
(blue plastic)  
Reduces corrugated  
cardboard wastes



### **Purchasing**

Some purchasing agents offer delivery of many healthcare products in reusable totes. This is a great waste minimization initiative.

- Review other opportunities for product delivery in reusable shipping containers instead of cardboard.



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- Visit the **Hospitals for A Healthy Environment *Environmentally Preferable Purchasing Site*** at [http://geocities.com/EPP\\_how\\_to\\_guide/](http://geocities.com/EPP_how_to_guide/)

### More Pollution Prevention Opportunities:

Track positive efforts such as toner cartridge recycling, kitchen grease recycling, durable goods reuse and recycling. Develop a training program on waste management for new employees to optimize participation in waste programs.



Digital thermometer on isolation cart in PACU



Recyclable Pulse Oximeters: Many Hospitals participate in the *Nellcor Pulse Oximeter* recycling program. Pulse oximeters returned to manufacturer for cleaning & refurbishing. Hospitals purchase them back at a reduced cost



Banded bags: Staff in cardiac cath lab make creative reuse of banded bags in most kits, by reusing them as trash bags. Eliminates the need of thousands of plastic bags/year.



Staff in cardiac cath lab use unused surgical towels in kits as cleaning cloths at the end of cases. creative reuse eliminates purchasing of thousands of disposable cloths/ year.

The City's p2 Program can help Albuquerque hospitals conduct waste audits. Contact the p2 Program at 873-7058/7059 for more information.